

WHAT IS CLAIMED IS:

1. An optical element having embedded in the surface of a lens substantially perpendicular thereto a conductive member whose diameter or width is smaller than the diameter of an optical spot on the lens surface.

2. The optical element as set forth in claim 1, wherein the conductive member is embedded on an optical axis of the lens symmetrically with respect to the optical axis, and an end point of the conductive member has the diameter smaller than the diameter of the optical spot on the lens surface and faces the lens surface.

3. The optical element as set forth in claim 1, wherein the conductive member is formed linear and embedded in the lens surface to cross the optical spot.

4. The optical element as set forth in claim 1, wherein the lens is a one selected from among a semi-spheric lens, a super solid immersion lens or an objective lens.

5. The optical element as set forth in claim 1, wherein the conductive member is made of a metal, a metalloid and a transparent conductive material having a different refractive index from the refractive index of the lens material.

6. The optical element as set forth in claim 1, wherein the conductive member has provided thereon an electrode through which a current is supplied.

7. An optical head having an optical element installed on a slider thereof and which reads a signal by illuminating an optical recording medium with a reading light,

the optical element having embedded in the surface of a lens substantially perpendicular thereto a conductive member whose diameter or width is smaller than

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the diameter of an optical spot on a lens surface.

8. The optical head as set forth in claim 7, wherein the optical element is a one selected from among a semi-spheric lens, a super SIL and an objective lens.

9. The optical head as set forth in claim 7, wherein the optical element is integrated with the slider.

10. The optical head as set forth in claim 7, wherein a signal detecting optical element and a reference optical element are provided and the conductive member is embedded in the signal detecting optical element.

11. The optical head as set forth in claim 7, wherein there is provided an electrode to supply the conductive member with a current.

12. A signal reproducing method comprising the steps of:  
splitting a laser light from a same source for incidence upon an optical element to form two optical spots on the focal plane of the optical element;

disposing in a position corresponding to one of the optical spots, a conductive member whose diameter or width is smaller than the diameter of the optical spot; and

taking the optical spot incident on the conductive member as a detection light while taking another optical spot as a reference light and reading a signal under the effect of an interference between return light beams from the optical recording medium.

13. A signal reproducing method comprising the steps of:

illuminating an optical element with a laser light, disposing a conductive

member in the position of an optical spot resulted from the laser light and supplying the conductive member with a high frequency current; and

detecting an interaction between a conductive material on an optical recording medium and the conductive member by extracting a signal synchronous with the high frequency and reading a signal recorded in the optical recording medium.

14. The signal reproducing method as set forth in claim 13, wherein the directions of the laser light deflecting surface and current are substantially perpendicular, or substantially parallel, to each other.